CLAIMS

We claim:

1. Cluster assembly apparatus for both low and medium voltage switchgear applications, the apparatus comprising:

   at least one fixed conductor element comprising a predetermined cross-sectional area and a longitudinal axis defining a centerline;

   at least one movable conductor element comprising a cross-sectional area corresponding to the fixed conductor element, a predetermined width, a longitudinal axis defining a centerline, and a dual 45 degree angled tapered tip, and wherein the fixed conductor and movable conductor elements are misaligned when the assembly is not engaged;

   resilient spring loaded connecting means fixedly attached to each fixed conductor element wherein at least one conducting bridge element provides electrical connection between a fixed conductor and a movable conductor when the cluster assembly is in a connected state;

   means to fixedly attach the resilient spring loaded connecting means to each fixed conductor element; and

   means to guide the resilient spring loaded connecting means to receive and engage the movable conductor element thus

providing the cluster assembly connected state wherein corresponding conductor centerlines are aligned.

2. The apparatus of claim 1, wherein each conducting bridge element further comprises at least two primary fingers, each finger comprising a predetermined width, a predetermined length, a center point midway along the finger length, two ends, a top side comprising a circular spring locator to receive a spring assembly therein towards one end, and a bottom side comprising a locator slot located at the end of the bottom side opposite from the finger end having the circular spring locator, a guide slot located on the finger bottom side at a point slightly off the center point of the finger towards the locator slot, and a 45 degree taper on the end nearest the circular spring locator.

3. The apparatus of claim 2, wherein the spring loaded connecting means further comprises a finger spring for each finger, comprising a formed circular end suitably sized to be positioned within the finger top side spring locator, a deformed convex top side, a deformed concave bottom side, and a foot end wherein the deformed convex top side and the deformed concave bottom side define a leaf spring mechanism, wherein the finger spring formed circular end is positioned within the finger top side spring locator aligning the leaf spring mechanism so that the spring convex top side bows

above the finger top side, and wherein the spring foot end rests on the finger top side providing a resilient finger spring assembly.

4. The apparatus of claim 3, wherein the means to fixedly attach the resilient spring loaded connecting means to each fixed conductor element further comprises a flat non-magnetic metal locator plate of a predetermined surface geometry and size further comprising a front surface, a back surface, a predetermined plate thickness, an array of slots of predetermined size and geometry through the plate surface to provide housing for at least one pair of oppositely opposed resilient finger spring assemblies wherein each such slot has a bottom edge, a top edge, and a predetermined width, and means for fixedly connecting the locator plate to a fixed conductor.

5. The apparatus of claim 4, wherein means to guide the resilient spring loaded connecting means to receive and engage the movable conductor element further comprises a flat non-magnetic metal guide plate comprising a surface geometry and size identical to the locator plate, and further comprising a front surface, a back surface, two vertical sides defining a predetermined plate thickness, an array of slots identical in size, location and geometry to the slots in the locator plate through the guide plate

surface to provide housing for a plurality of oppositely opposed resilient finger spring assemblies wherein each such slot has a bottom edge, a top edge, and a predetermined width, and means for accessing means for fixedly connecting the locator plate to a fixed conductor element.

6. The apparatus of claim 5, wherein the spring loaded connecting means further comprises at least two resilient finger spring assemblies positioned and residing within corresponding locator plate and guide plate slots by alignment of the respective finger locator slot for the locator plate and finger guide slot for the guide plate to positionally receive the corresponding edge of the locator plate and guide plate, wherein the finger spring deformed convex top side engages the corresponding locator plate and guide plate edges to secure each resilient finger spring assembly at an angle of declination of four degrees from the centerline of the movable conductor element while allowing sufficient movement of the oppositely opposed resilient finger spring assemblies to receive and engage the movable conductor element tapered tip and full element width, and wherein such oppositely opposed pair of resilient finger spring assemblies defines a gap distance between the tapered finger assembly edges which is smaller than the width of the movable conductor element.

7. The apparatus of claim 6, wherein the spring loaded connecting means further comprises an angle of declination of each resilient finger spring assembly of zero degrees from the centerline of the movable conductor element once the movable conductor element is engaged by the resilient finger spring assemblies.

8. The apparatus of claim 7, wherein the primary finger further comprises high conductivity copper 0.155 inches in thickness, and the primary finger is produced by stamping or similar high volume process.

9. The apparatus of claim 7, wherein the finger spring further comprises spring steel 18 gauge thick, 0.150 inches wide, and approximately 2 inches long, and the finger spring is produced by stamping or similar high volume process.

10. The apparatus of claim 7, wherein the locator plate and guide plate are each 10 gauge thick, and are manufactured using numerically controlled laser cutting equipment to easily vary plate sizes and shapes and to economically produce smaller numbers of parts.

11. The apparatus of claim 7, wherein the number of resilient finger spring assemblies per plate slot is more than one.

12. The apparatus of claim 7, wherein the array of plate slots and the number of resilient finger spring assemblies per plate slot are determined by the current rating desired.

13. The apparatus of claim 7, wherein the rated current range is from 600 amps to 6,000 amps.

14. The apparatus of claim 7, wherein the locator plate and guide plate geometries are rectangular, the locator plate further comprises two fixed arms of equal, predetermined length and height defining a predetermined width between the fixed arms each extending at right angles in the same direction from the locator plate front surface defining a predetermined width between the fixed arms, and the guide plate further comprises two notches of equal dimensions located at identical positions on each of the guide plate vertical sides defining a predetermined distance between the notch vertical sides and a predetermined notch height and sized to receive the fixed arms of the locator plate such that the arms pass through the notches, wherein the predetermined width of the fixed arms is slightly larger than the distance between the notch vertical sides and the predetermined notch height is slightly larger than the height of the vertical arms such that the guide plate slots correspond to the respective locator plate slots when the locator plate engages the guide plate.

15. The apparatus of claim 7, wherein the locator plate and guide plate geometries are circular.

16. Cluster switchgear assembly apparatus comprising:

at least one fixed conductor element comprising a predetermined cross-sectional area and a longitudinal axis defining a centerline;

at least one movable conductor element comprising a cross-sectional area corresponding to the fixed conductor element, a predetermined width, a longitudinal axis defining a centerline, and a dual 45 degree angled tapered tip, and wherein the fixed conductor and movable conductor elements are misaligned when the assembly is not engaged;

at least two primary fingers, each finger comprising a predetermined width, a predetermined length, a center point midway along the finger length, two ends, a top side comprising a circular spring locator to receive a spring assembly therein towards one end, and a bottom side comprising a locator slot located at the end of the bottom side opposite from the finger end having the circular spring locator, a guide slot located on the finger bottom side at a point slightly off the center point of the finger towards the locator slot, and a 45 degree taper on the end nearest the circular spring locator;

a finger spring for each finger, comprising a formed circular end suitably sized to be positioned within the

finger top side spring locator, a deformed convex top side, a deformed concave bottom side, and a foot end wherein the deformed convex top side and the deformed concave bottom side define a leaf spring mechanism, wherein the finger spring formed circular end is positioned within the finger top side spring locator aligning the leaf spring mechanism so that the spring convex top side bows above the finger top side, and wherein the spring foot end rests on the finger top side providing a resilient finger spring assembly;

a flat non-magnetic metal locator plate of a predetermined surface geometry and size fixedly connected to the fixed conductor element, and further comprising a front surface, a back surface, a predetermined plate thickness, an array of slots of predetermined size and geometry through the plate surface to provide housing for at least one pair of oppositely opposed resilient finger spring assemblies wherein each such slot has a bottom edge, a top edge, and a predetermined width;

a flat non-magnetic metal guide plate comprising a surface geometry and size identical to the locator plate, and further comprising a front surface, a back surface, two vertical sides defining a predetermined plate thickness, an array of slots identical in size,

location and geometry to the slots in the locator plate through the guide plate surface to provide housing for a plurality of oppositely opposed resilient finger spring assemblies wherein each such slot has a bottom edge, a top edge, and a predetermined width;

wherein each resilient finger spring assembly is positioned and resides within corresponding locator plate and guide plate slots by alignment of the respective finger locator slot for the locator plate and finger guide slot for the guide plate to positionally receive the corresponding edge of the locator plate and guide plate, wherein the finger spring deformed convex top side engages the corresponding locator plate and guide plate edges to secure each resilient finger spring assembly at a four degree angle of declination from the centerline of the movable conductor while allowing sufficient movement of the oppositely opposed resilient finger spring assemblies to receive and engage the movable conductor element tapered tip and full element width, and wherein such oppositely opposed pair of resilient finger spring assemblies defines a gap distance between the tapered finger assembly edges which is smaller than the width of the movable conductor element;

wherein the angle of declination of each resilient finger spring assembly is zero degrees from the centerline of the movable conductor element once the movable conductor element is engaged by the resilient finger spring assemblies; and

wherein corresponding fixed and movable conductor element centerlines are aligned when the assembly is engaged.

17. The apparatus of claim 16, wherein the primary finger further comprises high conductivity copper 0.155 inches in thickness, and the primary finger is produced by stamping or similar high volume process.

18. The apparatus of claim 16, wherein the finger spring further comprises spring steel 18 gauge thick, 0.150 inches wide, and approximately 2 inches long, and the finger spring is produced by stamping or similar high volume process.

19. The apparatus of claim 16, wherein the locator plate and guide plate are each 10 gauge thick, and are manufactured using numerically controlled laser cutting equipment to easily vary plate sizes and shapes and to economically produce smaller numbers of parts.

20. The apparatus of claim 16, wherein the number of resilient finger spring assemblies per plate slot is more than one.

21. The apparatus of claim 16, wherein the array of plate slots and the number of resilient finger spring assemblies per

plate slot are determined by the current rating desired.

22. The apparatus of claim 16, wherein the rated current range is from 600 amps to 6,000 amps.

23. The apparatus of claim 16, wherein the locator plate and guide plate geometries are rectangular, the locator plate further comprises two fixed arms of equal, predetermined length and height defining a predetermined width between the fixed arms each extending at right angles in the same direction from the locator plate front surface defining a predetermined width between the fixed arms, and the guide plate further comprises two notches of equal dimensions located at identical positions on each of the guide plate vertical sides defining a predetermined distance between the notch vertical sides and a predetermined notch height and sized to receive the fixed arms of the locator plate such that the arms pass through the notches, wherein the predetermined width of the fixed arms is slightly larger than the distance between the notch vertical sides and the predetermined notch height is slightly larger than the height of the vertical arms such that the guide plate slots correspond to the respective locator plate slots when the locator plate engages the guide plate.

24. The apparatus of claim 16, wherein the locator plate and guide plate geometries are circular.